

WHAT IS CLAIMED IS:

1. An oxide ion conductor represented by the formula $\text{Ln}_1\text{AGaB}_1\text{B}_2\text{B}_3\text{O}$,

wherein Ln_1 is at least one element selected from the group consisting of La, Ce, Pr, Nd, and Sm, the content thereof being 43.6 to 51.2 percent by weight,

A is at least one element selected from the group consisting of Sr, Ca, and Ba, the content thereof being 5.4 to 11.1 percent by weight,

the content of Ga is 20.0 to 23.9 percent by weight,

B_1 is at least one element selected from the group consisting of Mg, Al, and In,

B_2 is at least one element selected from the group consisting of Co, Fe, Ni, and Cu,

B_3 is at least one element selected from the group consisting of Al, Mg, Co, Ni, Fe, Cu, Zn, Mn, and Zr,

wherein, in the case in which B_3 is an element differing from B_1 or B_2 , the content of B_1 is 1.21 to 1.76 percent by weight, the content of B_2 is 0.84 to 1.26 percent by weight, and the content of B_3 is 0.23 to 3.08 percent by weight, and

in the case in which B_3 is an element equal to B_1 or B_2 , the total content of B_1 and B_3 is 1.41 to 2.70 percent by weight, and the total content of B_2 and B_3 is 1.07 to 2.10

percent by weight.

2. An oxide ion conductor according to Claim 1, wherein first crystal grains composed of elements Ln1, A, and Ga and second crystal grains composed of element B1 are present between matrix crystal grains other than the first crystal grains and the second crystal grains.

3. An oxide ion conductor according to Claim 1, wherein first crystal grains composed of elements Ln1, A, and Ga and second crystal grains composed of element B1 are present in the matrix crystal grains other than the first crystal grains and the second crystal grains.

4. An oxide ion conductor according to one of Claims 2 and 3, wherein the grain diameters of the first crystal grains and the second crystal grains are 0.1 to 2.0 μm .

5. An oxide ion conductor according to one of Claims 2 and 3, wherein the grain diameter of the matrix crystal grains is 2.0 to 7.0 μm .

6. An oxide ion conductor represented by the formula $\text{Ln1}_{1-x}\text{A}_x\text{Ga}_{1-y-z-w}\text{B1}_y\text{B2}_z\text{B3}_w\text{O}_{3-d}$,

wherein Ln1 is at least one element selected from the

group consisting of La, Ce, Pr, Nd, and Sm,

A is at least one element selected from the group consisting of Sr, Ca, and Ba,

B1 is at least one element selected from the group consisting of Mg, Al, and In,

B2 is at least one element selected from the group consisting of Co, Fe, Ni, and Cu,

B3 is at least one element selected from the group consisting of Al, Mg, Co, Ni, Fe, Cu, Zn, Mn, and Zr, and

x is 0.05 to 0.3, y is 0.025 to 0.29, z is 0.01 to 0.15, w is 0.01 to 0.15, $y+z+w$ is 0.035 to 0.3, and d is 0.04 to 0.3.

7. An oxide ion conductor according to Claim 6, wherein first crystal grains composed of elements Ln1, A, and Ga and second crystal grains composed of element B1 are present between matrix crystal grains other than the first crystal grains and the second crystal grains.

8. An oxide ion conductor according to Claim 6, wherein first crystal grains composed of elements Ln1, A, and Ga and second crystal grains composed of element B1 are present in the matrix crystal grains other than the first crystal grains and the second crystal grains.

9. An oxide ion conductor according to one of Claims 7 and 8, wherein the grain diameters of the first crystal grains and the second crystal grains are 0.1 to 2.0 μm .

10. An oxide ion conductor according to one of Claims 7 and 8, wherein the grain diameter of the matrix crystal grains is 2.0 to 7.0 μm .

11. A method for manufacturing an oxide ion conductor, comprising:

a step of mixing individual powdered oxides composed of Ln1, A, Ga, B1, and B2 in ratios in accordance with those described in Claim 1 so as to form a first powdered mixture;

a step of calcining the first powdered mixture at 500 to 1,300°C for 1 to 10 hours so as to form calcined powder;

a step of mixing a powdered oxide composed of B3 in a ratio in accordance with that described in Claim 1 with the calcined powder so as to form a second powdered mixture;

a step of molding the second powdered mixture into a molded body having a predetermined shape; and

a step of baking the molded body for sintering at 1,200 to 1,600°C for 0.5 to 20 hours.

12. A solid oxide fuel cell provided with an electrolyte comprising an oxide ion conductor according to

one of Claims 1 and 6.

13. A gas sensor comprising an oxide ion conductor according to one of Claims 1 and 6.

14. An oxygen separation membrane for use in an electrochemical oxygen pump, comprising an oxide ion conductor according to one of Claims 1 and 6.